relation between the metre and a suitable wavelength of light.

All who have been brought into contact with Dr. René Benoît, for so many years director of the international bureau, will regret to hear that he will be retiring from that position at the end of the present year. Dr. Benoît has been identified with all the principal researches which have been undertaken at that institution during the last thirty-six years. In this country his services in connection with establishing the relations between the units of the British and the metric systems of weight and measure will be especially remembered.

A GREAT TELESCOPE FOR CANADA.

A NOTABLE addition is to be made to the equipment of the Dominion Astronomical Observatory at Ottawa, Canada. At present its chief instrument is a 15-in. refractor. This has been used mainly for radial velocity determinations, and for some time its limitations have been keenly felt. Using low dispersion, spectrograms of fifth magnitude stars could be obtained, but beyond this it was ineffective, and it was recognised that further progress demanded a more powerful instrument. Supported by various scientific societies and representative astronomers, the chief astronomer, Dr. W. F. King, appealed to the Dominion Government for improved equipment, and the request was successful.

Contracts have been made for the construction of a 72-in. reflector. The optical parts will be made by the John A. Brashear Co., of Pittsburgh, Pa., and the mounting by Warner and Swasey, of Cleveland, Ohio. The cost will be about 90,000 dollars (18,000*l.*).

The focal length of the great mirror will be 30 ft., with a hole ten inches in diameter at its centre to allow for a Cassegrain combination. For this purpose a convex hyperboloidal mirror, with an aperture of 19 in. and a focal length of 10 ft., will be placed 23 ft. above the main mirror. The resulting focal length will be 108 ft.

The mounting will resemble those of the Melbourne and Ann Arbor reflectors. The skeleton tube will be at one side of the long polar axis, nearly midway between its bearings, the balance being restored by the declination mechanism and counterweights on the other side of the axis. It is hoped to have the telescope completed within two years.

The instrument will be used primarily for spectrographic determination of radial velocities. For the brighter stars it will be used in the Cassegrain form just described, the spectrograph being attached in the axis of the tube, below the 10-in. opening in the mirror. For the fainter stars a low-dispersion spectrograph will be attached at the principal focus. Direct photography of nebulæ, clusters, and other small areas of the sky will also be attempted.

To be used effectively, such an instrument demands a suitable position, and for more than a year Mr. W. E. Harper, of the observatory staff, has been investigating the astronomical possibilities of various regions ranging from Ottawa to the Pacific coast. Of all those tested, Victoria, B.C., showed a decided superiority in good "seeing" and small nocturnal range of temperature, and accordingly that place was chosen. The precise site is on Saanich Hill (elevation 732 ft.), about seven miles north of the city, from which it is easily reached by electric railway and carriage road.

The great dome will be 66 ft. in diameter and 60 ft. high. A building to contain offices, library, and reading rooms will also be erected. The total cost of buildings and equipment will be about 200,000 dollars (40,000*l.*). All the plans and specifications have been made by Dr. J. S. Plaskett, after consultation with many experts, and he will be in charge of the station.

C. A. CHANT.

NOTES.

DR. F. W. DYSON, Astronomer Royal, has been elected a correspondant of the Paris Academy of Sciences, in the section of astronomy.

VICE-ADMIRAL SIR EDMOND J. W. SLADE, K.C.I.E., K.C.V.O., has consented to act as president of the Meteorological Conference to be held in Edinburgh next September.

THE Bill introduced in the House of Commons by Sir Frederick Banbury, to prohibit experiments on dogs, was withdrawn on Tuesday, June 30, after a number of amendments to the principal clause had been carried in the Standing Committee appointed to consider the Bill.

MR. W. O. REDMAN KING, lecturer in zoology at the University of Leeds, has been appointed Ray Lankester investigator at the Marine Biological Laboratory at Plymouth, in succession to Prof. E. L. Bouvier, of Paris. The investigator is required to undertake research work of his own choosing at the laboratory for a period of five months, the emolument being 70*l.*

SIR JAMES CAIRD, of Dundee, has given 24,000*l.*, free of any conditions, to Sir Ernest Shackleton's Imperial Trans-Antarctic expedition. This gift relieves Sir Ernest of anxiety as to the financial side of the expedition, which will now be able to start well equipped in about a month's time. Further subscriptions would, however, be not unwelcome, and would be used to obtain accessories for increased efficiency.

THE Geologists' Association has arranged a long excursion to the Rhenish Westphalian Upland, including the volcanic districts of the Eifel, Siebengebirge, etc., on September 4–19 next. The various daily excursions will be attended by Prof. G. Steinmann, Dr. Tilman, and others as directors. The official party will leave Charing Cross on September 4, at 9 p.m. The excursion secretary is Mr. E. Montag, 18 Woodchurch Road, Prenton, Birkenhead.

AT the annual meeting of the Royal Society of Arts, held on Wednesday, June 24, the Duke of Connaught was re-elected president. A new by-law was adopted authorising members of the society to call themselves fellows. Since its foundation in 1754 the society has consisted of members only, but as most of the younger societies use the term fellow, many members of the society have expressed a wish that this title should also be used by members of the Royal Society of Arts.

THE Institute of Archæology in connection with the University of Liverpool, has arranged, in the rooms of the Society of Antiquaries, Burlington House, Piccadilly, on July 7–25, a special exhibition of antiquities, discovered at the excavations at Meroë, Sudan, during the past five seasons. The council of the University of Liverpool, we notice, has approved the acceptance by Prof. John Garstang, director of the excavations, of an invitation from the Sudan Government to be their honorary adviser to the Service of Antiquities of the Sudan.

THE statue of Captain Cook, the explorer, executed by Sir Thomas Brock, R.A., is to be unveiled on July 7 at noon. The statue has been placed on the Mall side of the Admiralty Arch, at the end of the Processional Road. It will be remembered that a statue of Captain Cook presented to the town of Whitby by the Hon. Gervase Beckett, M.P., was unveiled in that town on October 2, 1912. The erection of a fitting memorial to the great explorer in the capital of the Empire is largely due to the activity of the British Empire League.

IN a paper read before the Royal Geographical Society on June 22, Captain F. M. Bailey described his exploration of the Tsangpo, or Upper Brahmaputra river. The main results of the expedition were as follows:—The mapping of some 380 miles of the Tsangpo, which had previously been done by untrained or untrustworthy explorers; the mapping of the lower course of the Nagong Chu; the discovery of Gyala Peri, a snow-peak 24,460 ft. in height, and its glaciers. By observing the river where it breaks through the Himalayas some information regarding its enormous drop has been gained, and the falls reported to be 150 ft. in height have been proved to be merely an exaggerated rapid of 30 ft. The upper waters of the Subansivi have been discovered, and it is proved that this river rises north of the Himalayas, and breaks through the range. Many new snow-peaks, ranges, and rivers have been discovered, and a small collection of mammals, birds, and butterflies, among each of which were new species, was made.

INFORMATION has reached the Royal Geographical Society of the further work accomplished by Sir Aurel Stein in his new Central Asian expedition since he wrote at the end of last year. His objective was the region round Lop-nor, at the other extremity of the Tarim Basin, and various considerations obliged him to travel *viâ* Khotan. Pursuing a route hitherto largely unsurveyed, he moved to Maralbashi along the southernmost range of the Tien-shan, where he found some ruined Buddhist shrines, and thence towards the desert hills of the Mazar-tagh, the most forbidding ground he had hitherto encountered in the Taklamakan. Crossing the Tarim, he reached Niya, where he discovered an important sand-buried settlement with numerous documents inscribed on wood in the Indian language and script, furniture, household implements, etc. Meanwhile his Indian surveyor had resumed the triangulation along the Kun-lun range, thus connecting his observations with the Indian Trigonometrical Survey beyond the actual Lop-nor. Ample evidence of Chinese occupation, in the shape of a well-built fort and relics of the silk trade, which we know to have been a chief factor in opening the earliest route for Chinese direct intercourse with Central Asia and the distant West, was discovered. The ancient caravan route was marked by hundreds of early Chinese copper coins and unused arrow-heads dropped during the night marches. The difficulties were over when some scanty vegetation was reached, and the various parties reunited at Kumkuduk. A short halt at Tunhuang towards the end of March refreshed men and beasts, and after a renewed visit to the "Halls of the Thousand Buddhas," Sir Aurel Stein at the time of writing was starting to move into Kan-su for the work of the spring.

MANY readers of this journal will learn with deep regret of the death on June 13 of Mr. Thomas Thorp, whose name is widely known in connection with his transparent celluloid replicas of Rowland's and other diffraction gratings, whereby spectroscopes of high dispersion may be produced at a trifling cost. Born at Whitefield, near Manchester, and educated at the Manchester Grammar School, Mr. Thorp was apprenticed to a firm of architects and surveyors. Soon, however, he evinced a strong mechanical and scientific bent, and, happily combining a wonderful scientific ingenuity with a keen appreciation of the practical application of his inventions, he was able to follow his inclinations, to the great benefit of science and of industry. A much larger world owes to him the first "penny-in-the-slot" gas-meter. While every mechanical device was an object of fascination, optical instruments were most constantly in his thoughts. A keen amateur astronomer, he made himself several telescopes and took up the manufacture of small mirrors. His replica gratings were invented many years ago, but he constantly returned to the subject, producing silvered replicas, applying them to direct-vision spectroscopes, and especially applying the transparent replicas to colour-photography, for which last invention he was awarded the premium under the Wilde Endowment Fund by the Manchester Literary and Philosophical Society. Almost his latest invention was an ingenious method of varnishing telescope mirrors to prevent tarnish—a feat which he accomplished without sensibly impairing the definition. At the time of his death he was engaged on a machine by which he hoped to rule gratings superior to any yet produced. Mr. Thorp became a member of the Manchester Literary and Philosophical Society in 1896, and was one of the most valued members of its council from 1902 until his death. The Manchester Astronomical Society was similarly indebted to him. A man of sterling quality, beloved by all who knew him, some regret must be felt that an aversion to publication hindered the spread of his richly deserved reputation.

A VERY interesting exhibition of African big-game trophies, organised by *Country Life*, was opened on June 25 at the Royal Water Colour Society's Gallery, 5*a*, Pall Mall East, and will remain open until July 11. The total number of exhibits is 312, the greater portion of which are antelopes, the remainder comprising a couple of East African giraffe heads, some elephant tusks, a few rhinoceros heads, and heads of wart-hog, ibex, wild sheep, etc. The specimens are arranged, in the main, in zoological order, and are grouped, as a rule, in species, without recognition of races, and without scientific names, the same plan being followed in the catalogue. It is, however, difficult to understand why Diggle's hartebeest, which is but a local race of the tora, is widely separated from the typical race of that species, while the Sudani race of the bohor reedbuck, which is so remarkably different from the typical form of that species, is not distinguished from the latter. A similar remark is applicable to the separation of Buffon's kob from the white-eared kob, both these being merely races of a single variable species; it also applies, in a less degree to the sundering of the red lechwe from Mrs. Gray's black lechwe. As regards the trophies themselves, they include some of the finest representatives of their respective kinds, the gems of the whole series being perhaps three magnificent sable antelope skulls, each with horns of more than 60 in., and in one case reaching 62½ in. in length. Especially fine, too, are three heads of the giant eland of the Bahr-el-Ghazal, and a bongo head, in spite of its somewhat battered condition, is of special interest on account of its unusually dark colour, which is doubtless an indication of age. A western hartebeest head is noticeable for the great development of a light spectacle-mark, recalling that of Hunter's hartebeest. A number of other interesting specimens well deserve mention, but limitations of space prevent more than directing attention to the magnificent series of East African buffalo-heads. The exhibition reflects great credit on its organisers, although it might have contained a few more "records."

ON Friday last a demonstration of Williams's Firedamp Indicator was given at the Hotel Cecil. Instruments for detecting firedamp have been based on two broadly different principles. Some have depended upon the physical properties of the gas, in particular on its density, but these have suffered from want of sensitiveness and also from actual error unless the carbonic anhydride present is absorbed. An instrument of this class, in which the musical notes emitted by two pipes, one containing normal air and the other the air of the mine to be tested, but with the heavy and disturbing CO_2 removed, which gave rise to beats in the presence of a notable quantity of firedamp, has recently attracted some attention in Germany. The other class depends upon the heat of combustion of the gas present when helped by extraneous heating. This system is the more satisfactory, as there is so much more available and possible effect. A highly satisfactory instrument of this class was made about 1877, invented by E. H. Liveing, the well-known mining engineer; but though it would certainly show the presence of ¼ per cent. firedamp, while ½ per cent. was highly conspicuous, and it required nothing more than the turning of a handle to operate it, colliery engineers and proprietors at the time did not in general care to have it about the mine. The instrument invented by Mr. Williams belongs to this general class, but Prof. S. P. Thompson's report does not indicate that progress has been made in the direction either of simplicity or of delicacy. Shortly, it depends on the excess of temperature set up in one of two little balls of porous material containing platinum black, which are heated by an electrical current, and one of which is exposed to the air of the colliery. This one becomes the hotter of the two, and the excess of temperature is determined by electrical means. If, when the instrument is manufactured, it is found to work in an easy and satisfactory manner, it is to be hoped that the thirty-seven years which have elapsed since the construction of the Liveing instrument will have brought about some change in the attitude of those whom it is hoped to benefit.

THE question of the admissibility of evidence in criminal cases to prove the facts of detection of crime by bloodhounds has been at last raised in the Courts of Law. In a case before the High Court, Allahabad, reported in the *Pioneer Mail* of May 22, evidence was called to show that a cap and turban were found in the room of a murdered woman, and on these being shown to the dog, he guided the police to the house of the accused. The counsel for the defence objected to the admission of this evidence, on the ground of the impossibility of cross-examining the animal. This question was not actually decided; but the judge remarked: "I feel no hesitation in saying that the employment of trained intelligence of an animal of this description as an aid to detective work should, so far as possible, be confined to the detection of crime or the tracing down of an individual whose whereabouts are unknown, rather than for probative purposes. If the court is asked at the trial to draw inferences of vital importance from the conduct of an animal, it then becomes necessary that the court should have before it expert evidence of the very best description in order that it may feel justified in drawing them with certainty."

IN a paper recently read before the Royal Anthropological Institute, Profs. Seligmann and Parsons discussed a skeleton from one of the Cheddar caves discovered by the late Mr. R. C. Gough in 1877, and associated with bones of extinct animals, including bear, hyæna, bison, rhinoceros, and Irish elk. Stone implements found close to the skeleton are recognised by M. Breuil as belonging to the Magdalenian culture, the latest stage of the Palæolithic period. The prognathism of the skull is slight, and the Cheddar man did not possess the beetling brows of the Mousterian period. He seems to belong to the River-bed race, but this race is at present indistinguishable to the anatomist from the Neolithic people who, at a later period, buried their dead in the long barrows.

THE committee of the Castle Museum, Norwich, in their report for 1913, records a most successful year, the attendance and gate-money being remarkably good, and the list of additions large. Among the latter are a number of specimens of Indian and African big game, inclusive of a proportion on loan. Nature-study exhibitions formed a feature of the year's work.

IN the report of the council of the Natural History Society of Northumberland, Durham, and Newcastle-upon-Tyne, for 1904–10, published in vol. iv., part 1, of the new series of Transactions, attention is directed to the serious falling off in the number of members, which at that date was only 395. Had it not been for the Crawhall bequest of 6000*l*., the position of the society would have been serious, and the maintenance, to say nothing of the improvement, of the museum jeopardised.

VARIOUS kinds of interesting "animals" and birds in the Zoological Gardens form the subject of an illustrated article in the July number of the *Children's Magazine,* issued by the publishers of the "Children's Encyclopædia." Most striking of all is a photograph of the long-beaked echidna of New Guinea, despite the circumstance that the creature is referred to merely as the "egg-laying echidna," without regard to the fact that it represents a genus apart from the ordinary echidna, and also that it is alluded to "as a link with the ancient reptiles before the mammals came."

ACCORDING to the Annual Report on Sea-Fisheries, issued, in two parts, on June 19, the value of the catch landed in England and Wales during 1913 was no less than 10,337,000*l*., an increase of considerably more than a million over that of the previous year, which was the highest on record. Exclusive of "shell-fish," the weight of the food thus gathered amounted to something like 16,000,000 cwt., a very considerable proportion of the increase over 1912 being due to the prodigious take of herrings. A portion of this immense food-supply was diverted from the British Isles to go to foreign—mainly Dutch—ports, where a brisk and increasing trade in this commodity has sprung up of late years.

ALBEIT reported to be somewhat unwholesome, hilsa (*Clupea ilisha*) is by far the most succulent and tasty native fish served, during the rainy season, at Calcutta tables. With a view of increasing the supply, attempts at artificial propagation of the species were made in Bihar in the autumn of 1911 and 1912, when the fish are ascending the big rivers. These, however, according to a report by Mr. T. Southwell in a recent issue of the *Bihar Agricultural Journal,* proved unsuccessful, partly owing to the lack of ripe fish, and partly to the fact that the natural breeding places have not yet been discovered. Other attempts, on the lines of the shad-hatcheries in the United States, are to be attempted.

MR. J. H. ORTON, one of the naturalists of the Marine Biological Association's Laboratory at Plymouth, has for some time past been engaged in a comparative study of the ciliary mechanisms of various invertebrates and protochordates, and his latest contribution to the subject appears in a recent number of the Journal of the association (vol. x., No. 2). Mr. Orton shows that the "gill" in such widely separated animals as Crepidula, Lamellibranchiate Mollusca, Ascidians, and Amphioxus, is in the main an organ for collecting food and passing it to the alimentary canal. His views with regard to the mechanism of the process differ somewhat from those of certain earlier observers. Apparently the endostyle serves merely to secrete mucus and sweep it into the gill filaments, not as a food channel. One of his most interesting results is the discovery of an "endostyle" in the gasteropod Crepidula, which histologically closely resembles that of Amphioxus, and thus constitutes an extremely interesting case of convergent evolution.

IN NATURE of June 4 (p. 350), Lieut.-Col. Manners-Smith challenged some statements as to the destruction of bird-life in Nipal, made by Sir H. H. Johnston in an article on "The Plumage Bill," contributed to our issue of December 11, 1913. Sir Harry Johnston based his remarks partly upon reports by Mr. C. William Beebe, curator of birds, New York Zoological Society; and he has now sent us a letter from Mr. Beebe, from which we print the following extract:—"In that part of my pheasant monograph which deals with the pheasants and tragopans of Nipal, I have spoken of the havoc which the Nipalese shepherds are working, at least in the eastern part of the country. This I know from my own observations. There seems practically no way to put an end to the trapping of these men which goes on throughout the year. When I was in Calcutta, I was shown large boxes and bales of pheasant and other skins being exported for sale to milliners. The British officials told me that they were powerless to interfere, as the freight was sealed by the Rajah of Nipal's Government, and they, of course, had no authority to stop the exportation of goods from an independent country."

THE Hawaiian Volcano Observatory, which was built in 1812 on the edge of the crater of Kilauea, near the well-known Volcano House, is doing most useful work under the direction of Dr. T. A. Jaggar. Every week a bulletin appears giving an account of all changes taking place within the crater, and the varying activities of the several vents within it. The observatory was built, and is supported by, subscribers belonging to the Massachusetts Institute of Technology, and by other voluntary helpers in the Hawaiian Islands. The Whitney Laboratory of Seismology, which is established in the basement of the observatory, is furnished with the improved Omori seismometers and tromometers, their records being published in the same weekly bulletin. Scientific men desirous of carrying on vulcanological investigations are welcomed by the board of directors, and recently the facilities afforded at the observatory have permitted of very valuable observations being made on the gases emitted from the vents. The bulletin, of which, in its collected form, a second volume is being published, can be supplied to annual subscribers and to workers in vulcanology and seismology, as well as to scientific libraries in exchange for other publications.

IT may be interesting to note that while, generally speaking, the second half of April last was "very dry" in this country, very heavy rains accompanied by much flooding occurred generally over the Argentine Republic. An article by Mr. R. C. Mossman in *Symons's Meteorological Magazine* for June states that between April 21 and 27 from 8 to 14 in. of rain fell during a cyclone in the northern parts of that country, the maximum daily falls being from $8\frac{1}{2}$ to 9 in. Mr. Mossman states that although similar intensity has occurred locally in previous floods, it is not thought that such a widespread rainstorm has occurred before. Owing to difficulties of road transit it has been impossible in many instances to get the maize crop to the railway stations, with the result that an enormous deficit is already apparent in the receipts of the various railway companies.

IN the Journal of the Washington Academy of Sciences for June 4, Mr. F. E. Wright, of the Geophysical Laboratory, gives a *résumé* of the methods hitherto available for the determination of the index of refraction of a small drop of a liquid, and describes some interesting improvements he has introduced. One of these enables the index to be determined with an ordinary petrographic microscope to one unit in the third decimal place. It depends on the use of a stage refractometer made from a small sheet of optically dense lead glass, the upper surface polished, the lower parallel surface matt, and the edge bevelled to make an angle of 60° with the former surfaces. The sheet is cut in two by a plane perpendicular to the bevelled edge, one-half turned over, and the two bevelled edges brought together. Between them the drop is placed, and the boundary between the transmitted and totally reflected portions of the field, is read on the eyepiece scale, which is calibrated by the help of standard liquids. A simple device which enables the Abbe-Pulfrich refractometer to be used with light incident at the grazing angle, even with a small drop of liquid, is also described.

IN the *Atti dei Lincei* (vol. xxiii., p. 523) Prof. L. Marino and F. Gonnelli describe a modification of the ordinary Kjeldahl method for estimating nitrogen based on the pronounced catalytic activity of vanadium oxide. It is shown that, by carrying out the ordinary decomposition process with sulphuric acid in presence of potassium sulphate and a trace of vanadium pentoxide exact results are obtained in a large number of cases. The process suggested is recommended when the ordinary Gunning process is carried out with difficulty, or in cases where the use of mercury gives rise to mercury-ammoniacal compounds which resist decomposition. It is shown by special experiments that vanadium, even when present in quantity, does not retain even traces of ammonia.

THE *South African Journal of Science* (March, 1914) contains a paper by Dr. C. F. Juritz on the chemical composition of rain in the Union of South Africa. This forms part of a scheme for the world-wide and systematic examination of rain-water from the point of view of both composition and total rainfall, and more particularly as regards the nitrogen brought into the soil in the form of rain. The data are as yet somewhat incomplete, but it appears that in general more nitric nitrogen is brought down by the summer than by the winter rains, and the same is true of the nitrogen in the form of ammonia, although the rule is sometimes reversed. The total nitrogen per acre in the rainfall of South Africa ranged from 1·5 to 6·2 lb. per annum. The chlorine was abnormally high in some instances, amounting in the Durban districts to 60–70 lb. per acre.

IN the current number of the *Comptes rendus* of the Paris Academy of Sciences is a paper by Otto Scheuer on the reduction of carbon monoxide by hydrogen in the presence of radium emanation. Starting with 240·122 c.c. of a mixture of these two gases containing 43·71 per cent. of hydrogen, after nineteen days the volume was reduced to 217·332 c.c., representing a loss of 1·8 c.c. per Curie-hour. The analysis of the residual gas gave figures consistent with the assumption of the formation of methane, with possibly a little ethane. The gaseous mixture contained neither methyl alcohol nor formaldehyde, but from the appearance of a minute solid deposit in a second experiment the author concludes that formaldehyde may be the primary reduction product, this being finally reduced to methane. The reaction is accompanied by the formation of water.

Engineering for June 26 contains an illustrated article dealing with Mr. F. Baines's report on the condition of the roof timbers of Westminster Hall. Mr. Baines demonstrates the necessity of large and effective repair, and discusses the proper treatment that will give to the roof the necessary strength and support without injuring its historical character or archæological features. Tender regard for the ancient work overthrows all proposals for securing the roof by piecing up defective members, and a system of steel reinforcement has been approved as the most suitable course. Supposing the timber decay to continue, the loads would be borne by the steel reinforcement, and the possibility of complete collapse would be eliminated. An entire truss of steel will be added to the existing timber work, of sufficient strength to support the whole of the present roof, together with the weight of the steel-work itself, so as to bring the total weight of the strengthened roof to a safe and satisfactory bearing on the walls. Both walls and foundations are strong enough to bear the additional weight of the steel and to resist any possible outward thrust such a weighty reinforcement might produce. The work will take six years to execute.

A SECOND edition of Dr. A. Harden's monograph on "Alcoholic Fermentation" has been published by Messrs. Longmans, Green and Co. The first edition was reviewed in the issue of NATURE for June 29, 1911 (vol. lxxxvi., p. 579); and though no change has been made in the scope of the work, the rapid progress of the subject has rendered necessary many additions to text, and an increase in the bibliography. —The Society for Promoting Christian Knowledge has published a second edition of Canon McClure's "Modern Substitutes for Traditional Christianity." The first edition was reviewed in NATURE on March 26, 1914 (vol. xliii., p. 81), and it will be sufficient to say of the present edition that it has been revised and has added to it a chapter on modernism, which is also issued separately, price 6*d*. net.

A SECOND edition of their List No. 52 has been issued by Messrs. A. Gallenkamp and Co., Ltd., of Sun Street, Finsbury Square, London, E.C. The catalogue deals in an exhaustive manner with charts, diagrams, lanterns, and lantern slides, botanical and hygenic models, and other requirements of lecturers and teachers. The list brings together in a convenient manner the publications, and so on, of a great variety of firms, and will save intending purchasers much time and trouble. Even a glance through these well-illustrated 200 pages is enough to show the wealth of pictorial illustration now at the disposal of lecturers.

OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL OCCURRENCES FOR JULY:—

July 2. 11h. 0m. Earth at greatest distance from the Sun.
8. 23h. 27m. Uranus in conjunction with the Moon (Uranus 1° 42′ N.).
9. 19h. 14. Jupiter in conjunction with the Moon (Jupiter 0° 32′ N.).
16. 6h. 0m. Mercury in inferior conjunction with the Sun.
20. 2h. 43m. Saturn in conjunction with the Moon (Saturn 5° 59′ S.).
21. 2h. 0m. Neptune in conjunction with the Sun.
„ 19h. 46m. Mercury in conjunction with the Moon (Mercury 8° 37′ S.).
22. 10h. 50m. Neptune in conjunction with the Moon (Neptune 3° 43′ S.).
25. 18h. 24m. Venus in conjunction with the Moon (Venus 1° 52′ N.).
26. 4h. 33m. Mars in conjunction with the Moon (Mars 2° 7′ N.).
„ 17h. 0m. Mercury stationary.

THE RADIATION OF THE SUN.—The Journal of the Franklin Institute for June (vol. clxxvii., No. 6, p. 641) publishes an article on the "Radiation of the Sun," being an address presented by Prof. C. G. Abbot at the meeting of the section of physics and chemistry. The article is popularly written, and displays the general nature of the problem of solar radiation, and the different researches which have and are being pursued to elucidate the knotty points. Interesting photographs, diagrams, and curves accompany the text, and the name of the distinguished author is a guarantee of the accuracy of the information given. Articles such as the above are most valuable to those whose work in astronomy lies along other lines, but who keenly desire to be posted on the progress of the researches of workers in other branches of the subject.

DISPLACEMENT OF THE LINES TOWARDS THE VIOLET IN THE SOLAR SPECTRUM.—Dr. T. Royds, acting director of the Kodaikanal Observatory, gives the results of his researches (Bulletin No. 38) in the form of a preliminary note on the displacement to the violet of some lines in the solar spectrum. While the majority of the metallic lines in the solar spectrum are shifted towards the red when compared with their positions in the electric arc, there are, however, many exceptions, and some of these are specially dealt with in this paper, the iron arc spectrum being compared with that of the sun's centre. A full list of the wave-lengths of the lines employed and their intensities in long or short arcs, with other data, accompany the discussion. Summarising briefly the results, it may be stated that the iron lines which are unsymmetrically widened to the red in the arc are displaced to the violet in the sun relative to a short iron arc, and those unsymmetrically widened to the violet are displaced to the red. Symmetrical lines give normal displacement to the red. The change of wave-length of certain classes of iron lines is caused in a way other than by pressure or motion in the line of sight. The unsymmetrical iron lines are displaced in the short arc compared with the long arc. Those widened towards the red are displaced to the red in the short arc, and those widened towards the violet to the violet, whilst symmetrical lines have mostly small displacements. Differences in the density of vapour is suggested as a possible cause of the displacement between the different kinds of arc; but the matter, as Dr. Royds remarks, requires further investigation. The longer the iron arc, the more nearly do the conditions approach those in the reversing layer of the sun. Lines of other elements than iron also have sun minus arc displacements, which cannot be explained as due to pressure or line of sight motion.

METEORS ON JUNE 25–26.—Mr. W. F. Denning writes us that, though meteoric phenomena are seldom displayed abundantly on a June night, he observed some strikingly brilliant and interesting meteors on Thursday, June 25. At 10.39 a 2nd magnitude was seen nearly stationary, and close to its radiant at $269^\circ+46^\circ$. At 10.52 a fine meteor, exceeding 1st magnitude, crossed τ Herculis and θ Draconis in a rapid flight, and left a transient streak. Radiant at $260^\circ-24^\circ$, and height of object forty-eight to forty-four miles; path, fourteen miles, and velocity twenty miles a second. At 11.28 a bright meteor equal to Venus fell about 6° to the right of α Andromedæ, and left a streak. Its radiant was at $342^\circ+39^\circ$, and its height fifty-one to twenty-five miles, path forty-five miles, and velocity thirty miles a second. At 11.52 a meteor equal to Jupiter glided down the eastern sky about 2° to the left of α–β Pegasi, its flight being as nearly as possible parallel with those stars. Graceful, slow motion, there was no trace or streak, yellow nucleus. Radiant at $354^\circ+77^\circ$, and height fifty-nine to twenty-three miles. Path, forty-six miles; velocity, eighteen miles a second. At 11.58 another meteor equal to Jupiter shot swiftly upwards in the eastern region of Cygnus, leaving a bright phosphorescent streak for several seconds. Its radiant was on the eastern horizon at $350^\circ-8^\circ$, and its height sixty-seven miles; path, fifty-two miles, and velocity, about fifty-two miles a second. At 12.57 a 3rd magnitude meteor with a streak was directed from a radiant at $24^\circ+42^\circ$, and at 12.58 a very slow 2nd magnitude was seen in Camelopardalus moving from the direction of Ursa Major. Others were observed, and the sky remained beautifully clear during the night. The heights, etc., of the several meteors given are computed from duplicate records obtained by those enthusiastic observers, Mr. and Mrs. Wilson, of Bexley Heath, Kent.

REPORT OF THE U.S. NAVAL OBSERVATORY FOR 1913.—The report of the superintendent of the U.S. Naval Observatory for the fiscal year 1913 forms Appendix 2 to the annual report of the chief of the Bureau of Navigation, 1913. Commencing with the interesting statement that "this observatory, being the first institution in the world to have its time signals regularly transmitted by radio-telegraphy," the superintendent proceeds to describe the part played by the delegates appointed to represent the United States at the Inter-